



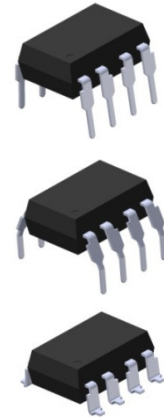
THE DATASHEET OF EL3120



8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120

Features:

- Guaranteed performance from -40 to 100°C
- Peak Output Current : $I_{OP} = \pm 2.5A$ (max)
- Threshold Input Current: $I_{FLH} = 5$ mA (max)
- Common mode transient immunity : $\pm 15kV/\mu s$ (min)
- High isolation voltage between input and output ($V_{iso}=5000$ V rms)
- Pb free and RoHS compliant.
- cUL approved (E214129)
- VDE approved (40028391)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved



Description

The EL3120 consists of an infrared light emitting diodes and integrated high gain, high-speed photo detectors. The device is housed in a 8 pin DIP package.

The photo detector has an internal shield that provides a guaranteed common-mode transient immunity of ± 15 kV/ μs . It is suitable for direct gate driving circuit for IGBTs or power MOSFETs.

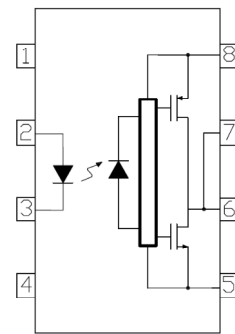
Applications

- Isolated IGBT/Power MOSFET gate drive
- Industrial Inverter
- AC brushless and DC motor drives
- Inverter for home appliances

Truth Table

Input	$V_{CC}-V_{EE}$		Output
	Positive Going	Negative Going	
L	0 to 30 V	0 to 30V	L
H	0 to 11.5V	0 to 10V	L
H	11.5 to 13.5V	10 to 12V	Transition
H	13.5 to 30V	12 to 30V	H

Schematic



Pin Configuration

- 1, NC
- 2, Anode
- 3, Cathode
- 4, NC
- 5, V_{EE}
- 6, V_{O2}
- 7, V_{O1}
- 8, V_{CC}

8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120

Absolute Maximum Ratings (T_A=25 °C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I _F	25	mA
	Pulse Forward Current* ¹	I _{FP}	1	A
	Reverse voltage	V _R	5	V
Output	"H" Peak Output current* ²	I _{OPH}	3	A
	"L" Peak Output Current* ²	I _{OPL}	3	A
	Peak Output Voltage	V _O	35	V
	Supply Voltage	V _{CC} - V _{EE}	0 to 35	V
	Power Dissipation	P _C	250	mW
Operating frequency* ³		f	50	kHz
Isolation voltage * ⁴		V _{ISO}	5000	V rms
Total Power Dissipation		P _T	300	mW
Operating temperature		T _{OPR}	-40 ~ +100	°C
Storage temperature		T _{STG}	-55 ~ +125	°C
Soldering temperature * ⁵		T _{SOL}	260	°C

Notes

*1 Pulse width ≤ 1 μs, 300pps.

*2 Max. pulse width=10us, max. duty cycle =1.1%

*3 Exponential waveform pulse width P_w ≤ 0.3us, I_{OPH} ≥ -2.5A, I_{OPL} ≤ 2.5A,

*4 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1 to 4 are shorted together, and pins 5 to 8 are shorted together.

*5 For 10 seconds.

8PIN DIP IGBT/MOSFET

2.5A Output Current GATE DRIVER PHOTOCOUPLER

EL3120

Electrical Characteristics

Apply over all recommended condition, typical value is measured at $V_{CC}=30V$, $V_{EE}=\text{ground}$, $T_A=25^\circ\text{C}$ unless specified otherwise.

Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Forward voltage	V_F	-	1.4	1.8	V	$I_F = 10\text{mA}$
Reverse voltage	V_R	5.0	-	-	V	$I_R = 10\mu\text{A}$
Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	-	-1.9	-	mV/ $^\circ\text{C}$	$I_F = 10\text{mA}$
Input capacitance	C_{IN}	-	60	-	pF	$V_F=0$, $f=1\text{MHz}$

Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
High level supply current	I_{CCH}	-	1.65	3.8	mA	$I_F=7$ to 10mA , $V_O=\text{Open}$
Low level supply current	I_{CCL}	-	1.55	3.8		$V_F=0$ to 0.8V , $V_O=\text{Open}$

Transfer Characteristics

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
High Level Output Current* ⁶	I_{OH}	-1	-	-	A	$V_O=V_{CC}-3V$
		-2	-	-		$V_O=V_{CC}-6V$
Low Level Output Current* ⁶	I_{OL}	1	-	-	A	$V_O=V_{EE}+3V$
		2	-	-		$V_O=V_{EE}+6V$
High Level Output Voltage	V_{OH}	$V_{CC}-6.25$	-	-	V	$I_F=10\text{mA}$, $I_O=-2.5\text{A}$
		$V_{CC}-0.25$	-	-		$I_F=10\text{mA}$, $I_O=-100\text{mA}$
Low Level Output Voltage	V_{OL}	-	-	$V_{EE}+6.25$	V	$I_F=0\text{mA}$, $I_O=2.5\text{A}$
		-	-	$V_{EE}+0.25$		$I_F=0\text{mA}$, $I_O=100\text{mA}$
Input Threshold Current	I_{FLH}	-	2.3	5	mA	$I_O=0\text{mA}$, $V_O > 5V$
Input Threshold Voltage	V_{FHL}	0.8	-	-	V	$I_O=0\text{mA}$, $V_O < 5V$
Under Voltage Lockout Threshold	V_{UVLO+}	11.5	-	13.5	V	$I_F=10\text{mA}$, $V_O > 5V$
Under Voltage Lockout Threshold	V_{UVLO-}	10.0	-	12.0	V	$I_F=10\text{mA}$, $V_O < 5V$

8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120

Switching Characteristics

Apply over all recommended condition, typical value is measured at $V_{CC}=30V$, $V_{EE}=\text{ground}$, $T_A=25^\circ\text{C}$ unless specified otherwise.

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Condition
Propagation delay time to output High level	t_{PLH}	150	200	300	ns	$I_F=7$ to 16mA $C_L=10\text{nF}$, $R_L=10\Omega$, $f=10\text{kHz}$, Duty=50%, $T_A=25^\circ\text{C}$
Propagation delay time to output Low level	t_{PHL}	120	170	300	ns	
Pulse width distortion	$ t_{PHL} - t_{PLH} $	-	30	100	ns	
Propagation Delay Skew* ⁷	t_{PSK}	-	-	40	ns	
Output rise time	t_r	-	60	-	ns	
Output fall time	t_f	-	60	-	ns	
UVLO Turn on Delay	$t_{UVLO\ ON}$		30		us	$I_F=10\text{mA}$, $V_O>5V$
UVLO Turn off Delay	$t_{UVLO\ OFF}$		0.4		us	$I_F=10\text{mA}$, $V_O<5V$
Common Mode Transient Immunity at Logic High* ⁸	CM_H	-15	-	-	kV/ μS	$I_F=7$ to 16mA , $V_{CC}=30V$, $R_L=350\Omega$, $T_A=25^\circ\text{C}$ $V_{CM}=2\text{kV}$
Common Mode Transient Immunity at Logic Low* ⁹	CM_L	15	-	-	kV/ μS	$V_F=0V$, $V_{CC}=30V$, $R_L=350\Omega$, $T_A=25^\circ\text{C}$ $V_{CM}=2\text{kV}$

Notes:

*6 Max. pulse width=10us, max. duty cycle =1.1%

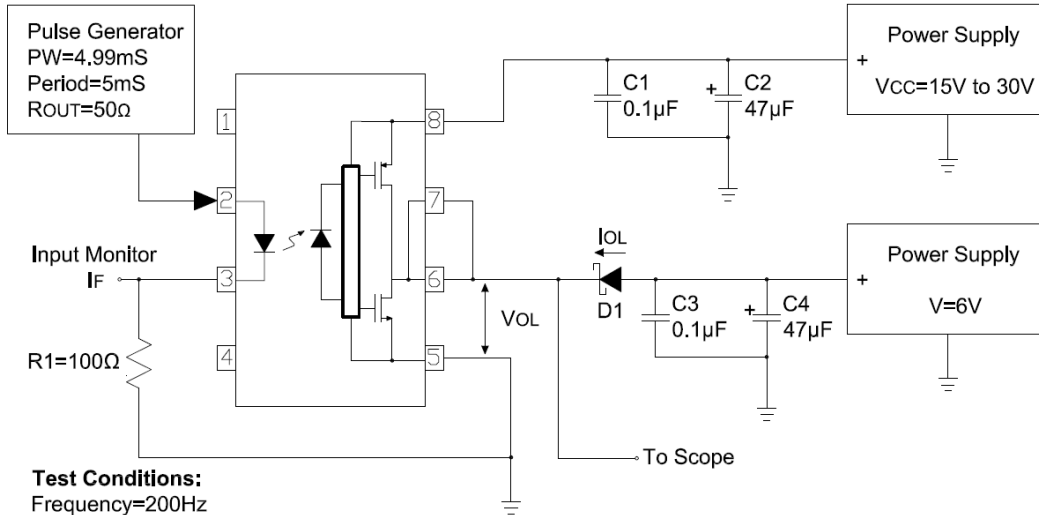
*7 Propagation delay skew is defined as the difference between the largest and smallest propagation delay times (i.e. t_{PHL} or t_{PLH}) of multiple samples. Evaluations of these samples are conducted under identical test conditions (supply voltage, input current, temperature, etc).

*8 Common mode transient immunity at output high is the maximum tolerable negative dv/dt on the trailing edge of the common mode impulse signal, V_{CM} , to assure that the output will remain high (i.e. $V_O>15.0V$)

*9 Common mode transient immunity at output low is the maximum tolerable positive dv/dt on the leading edge of the common mode pulse signal, V_{CM} , to assure that the output will remain low (i.e. $V_O<1.0V$)

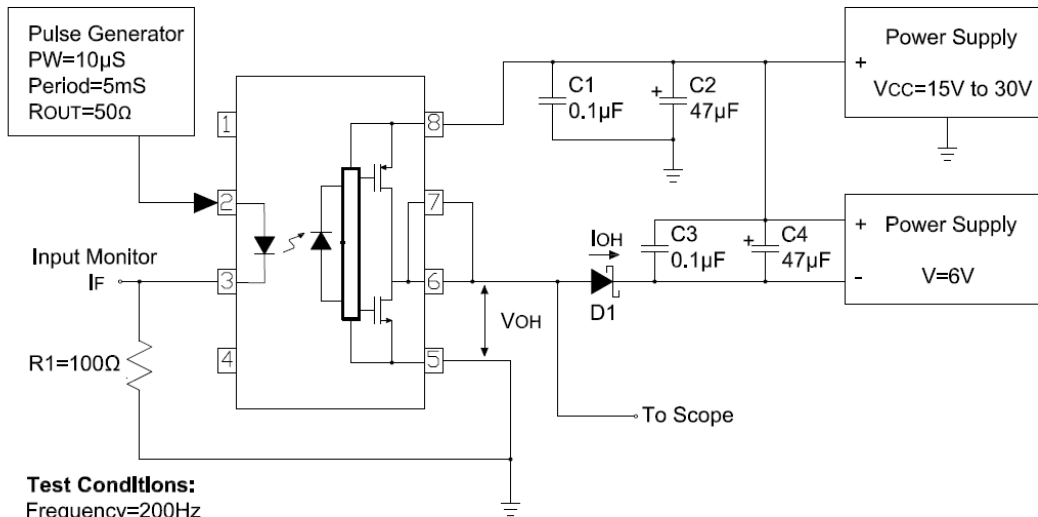
8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120

Test Circuit



Test Conditions:
 Frequency=200Hz
 Duty Cycle=99.8%
 VCC=15V to 30V
 VEE=0V
 VF(OFF)= -3.0V to 0.8V

I_{OL} Test Circuit



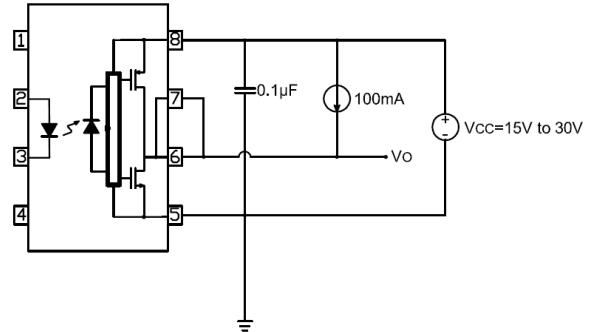
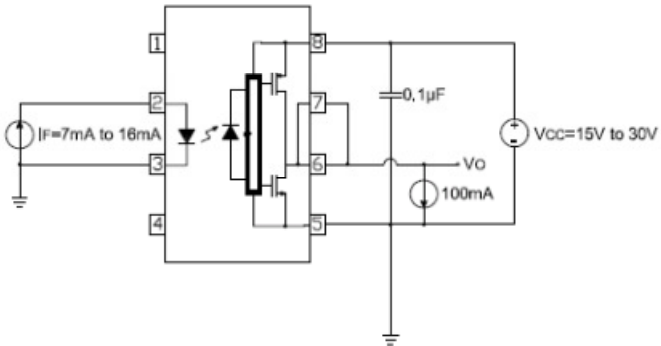
Test Conditions:
 Frequency=200Hz
 Duty Cycle=0.2%
 VCC=15V to 30V
 VEE=0V
 IF=7mA to 16mA

I_{OH} Test Circuit

8PIN DIP IGBT/MOSFET

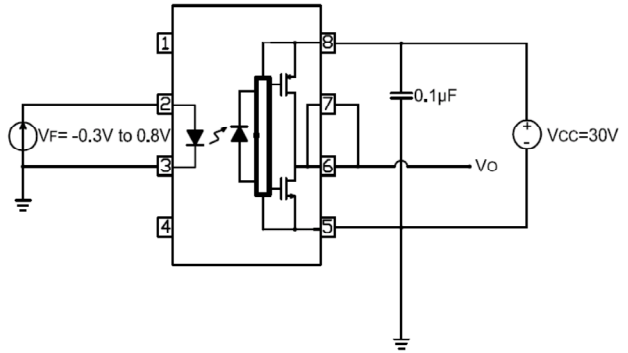
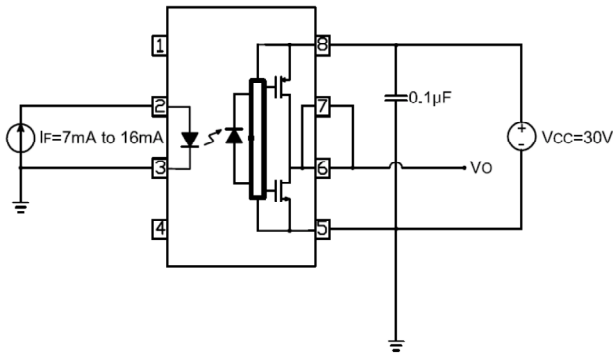
2.5A Output Current GATE DRIVER PHOTOCOUPLER

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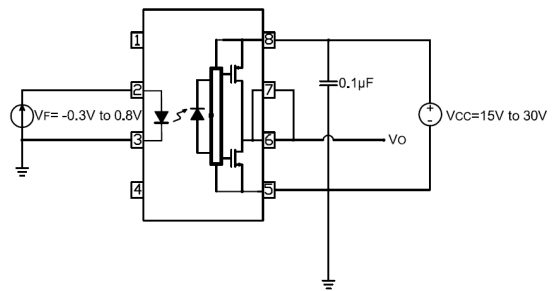
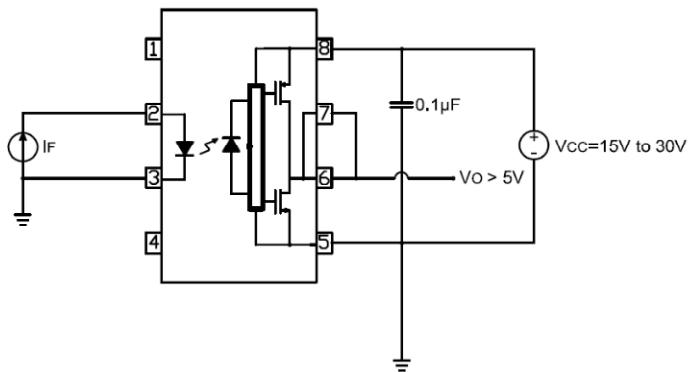
V_{OH} Test Circuit

V_{OL} Test Circuit



I_{CCH} Test Circuit

I_{CCL} Test Circuit



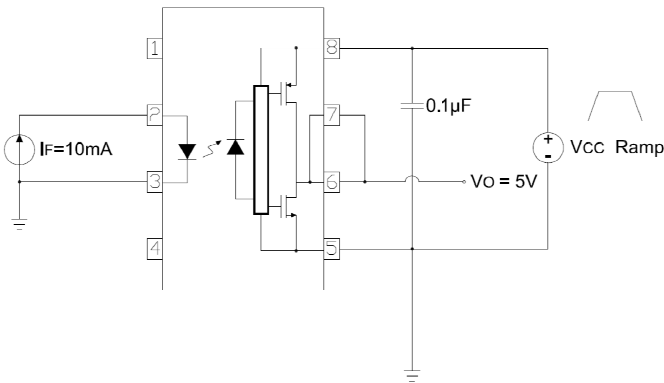
I_{FLH} Test Circuit

V_{FHL} Test Circuit

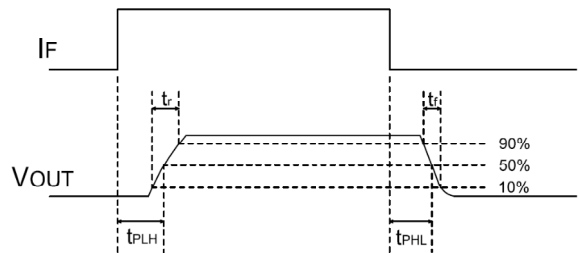
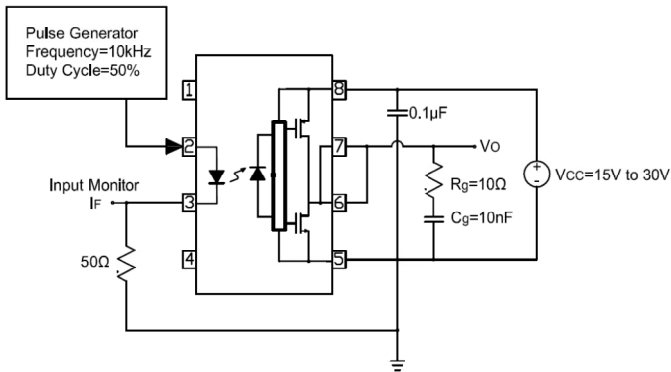
8PIN DIP IGBT/MOSFET

2.5A Output Current GATE DRIVER PHOTOCOUPLER

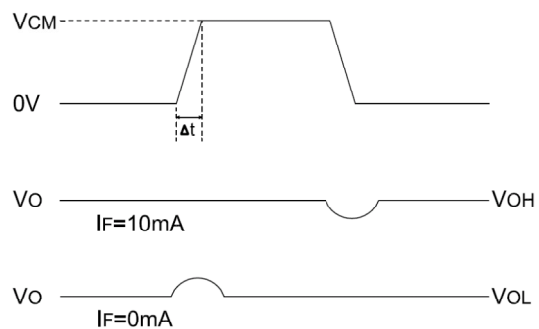
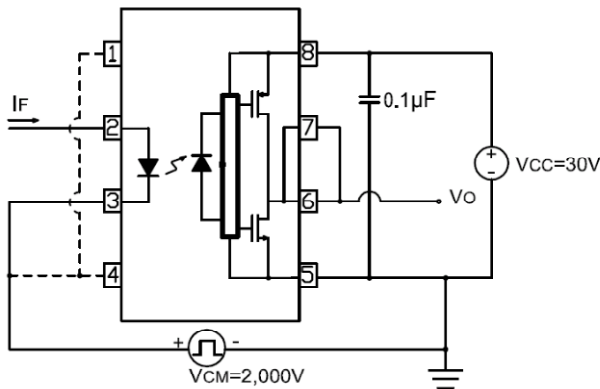
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UVLO Test Circuit



t_{PHL} , t_{PLH} , t_r and t_f Test Circuit and Waveforms



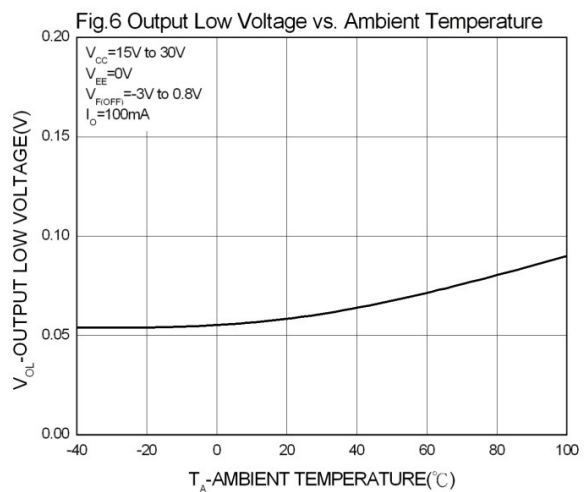
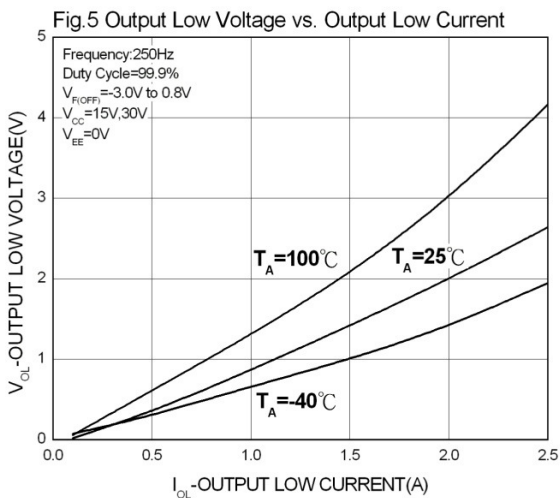
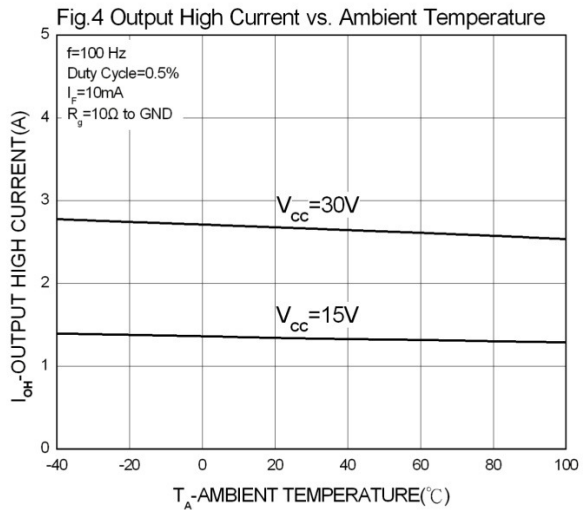
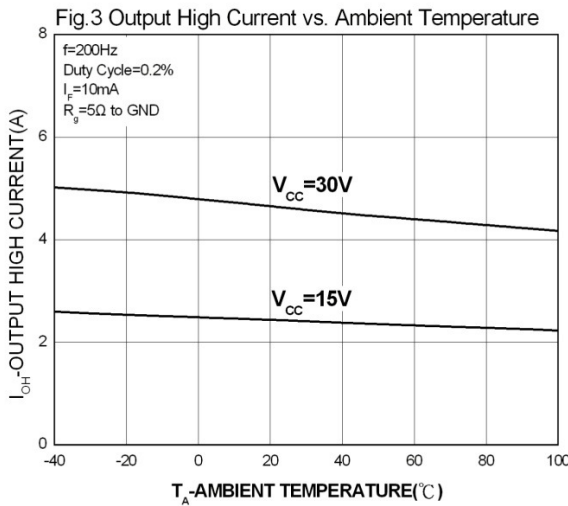
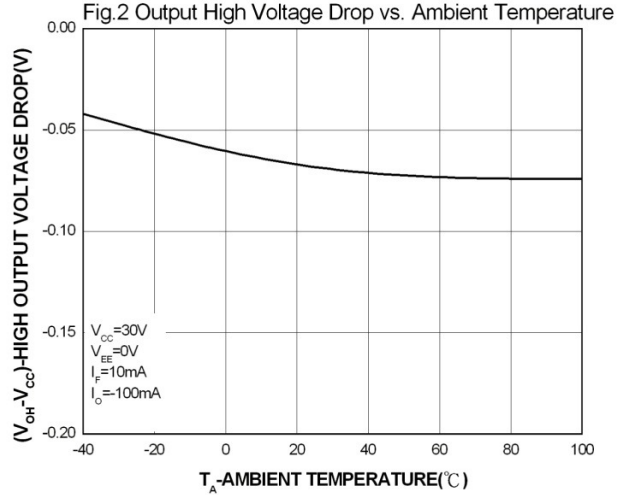
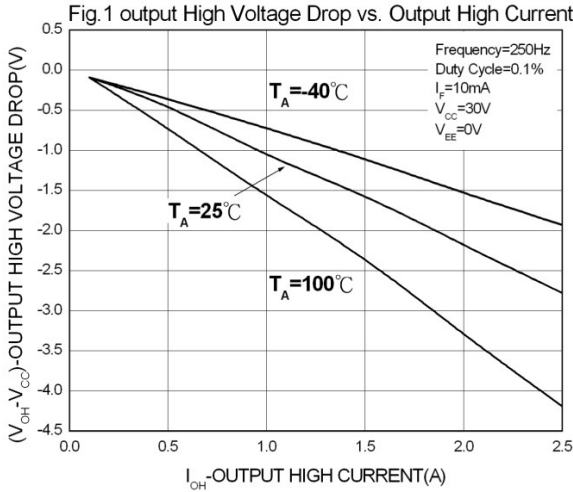
CMR Test Circuit and Waveforms

8PIN DIP IGBT/MOSFET

2.5A Output Current GATE DRIVER PHOTOCOUPLER

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Typical Performance Curves



8PIN DIP IGBT/MOSFET

2.5A Output Current GATE DRIVER PHOTOCOUPLER

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Fig.7 Output Low Current vs. Ambient Temperature

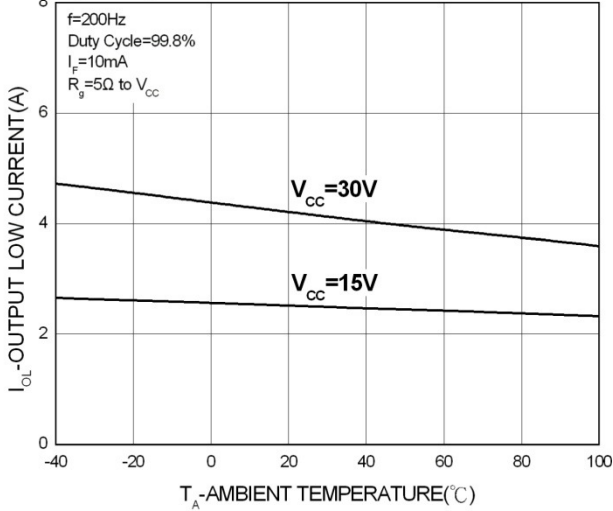


Fig.8 Output Low Current vs. Ambient Temperature

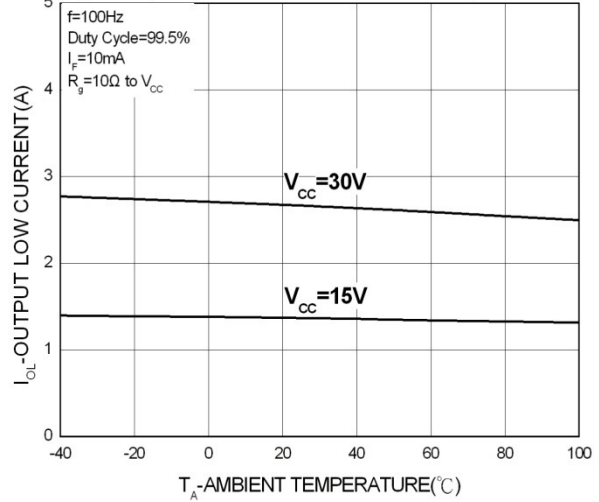


Fig.9 Supply Current vs. Ambient Temperature

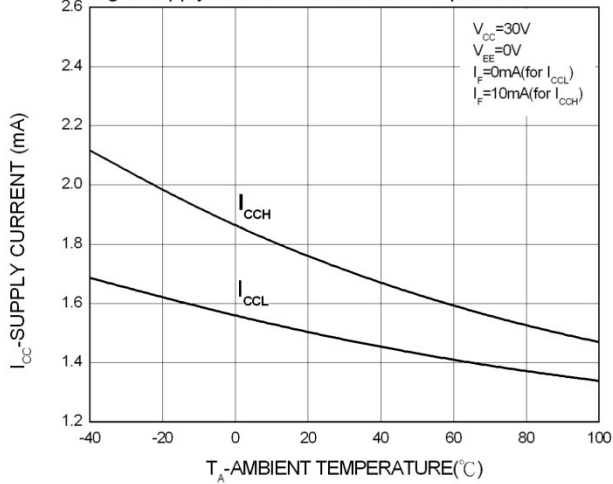


Fig.10 Supply Current vs. Supply voltage

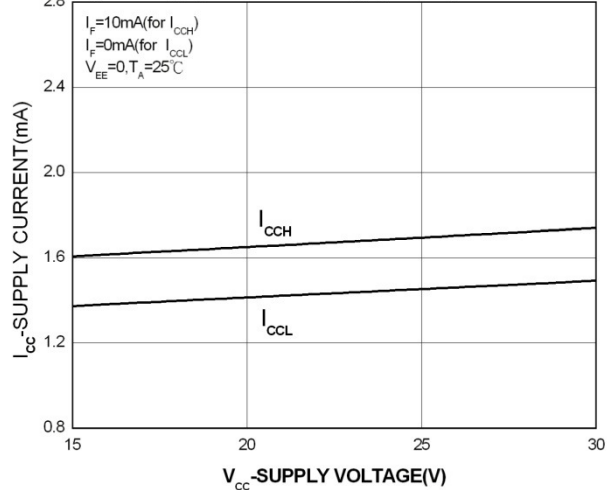


Fig.11 Low to High Input Current Threshold vs. Ambient Temperature

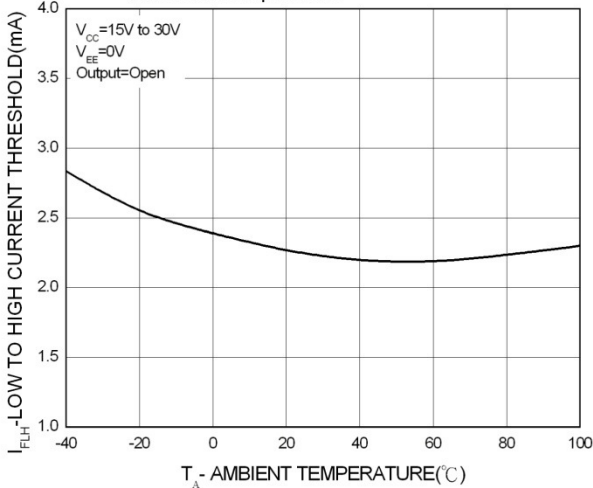
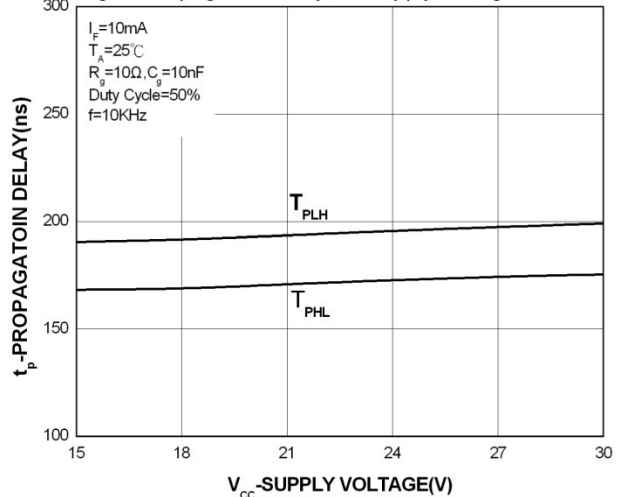


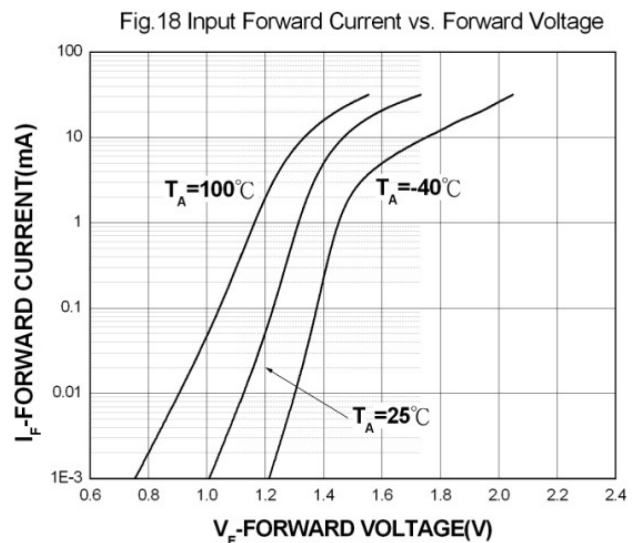
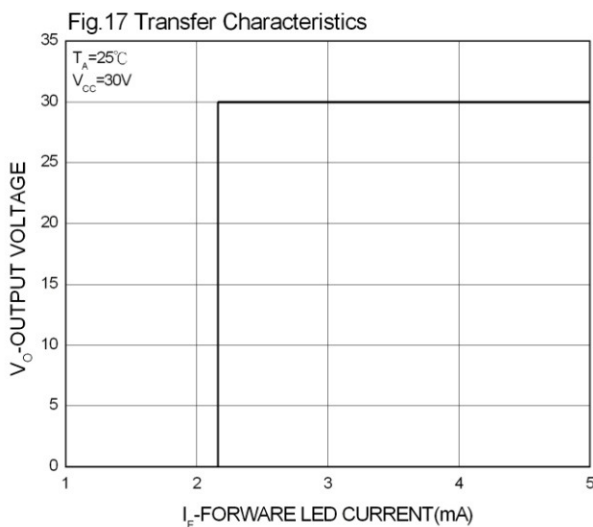
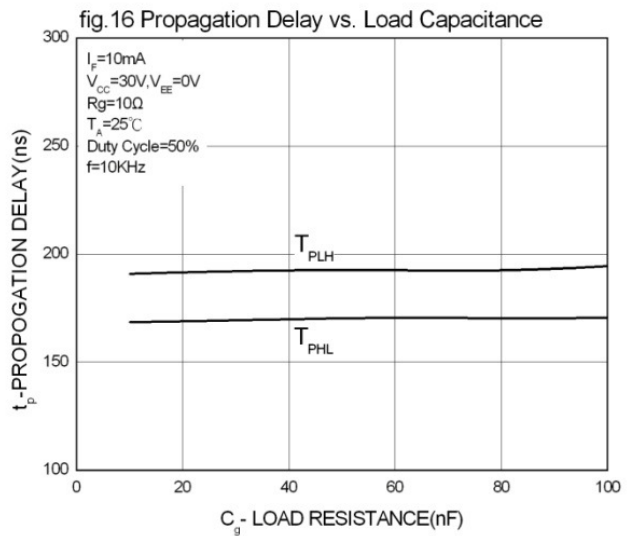
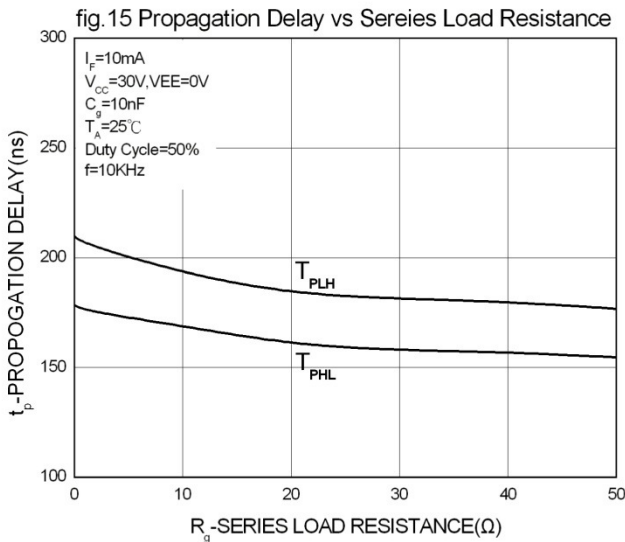
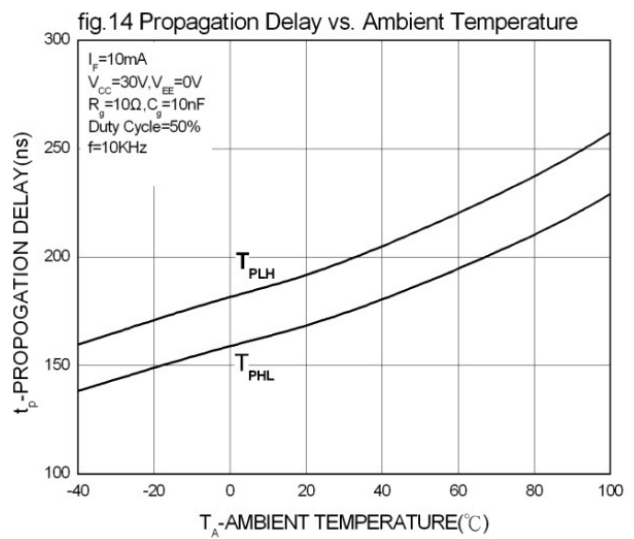
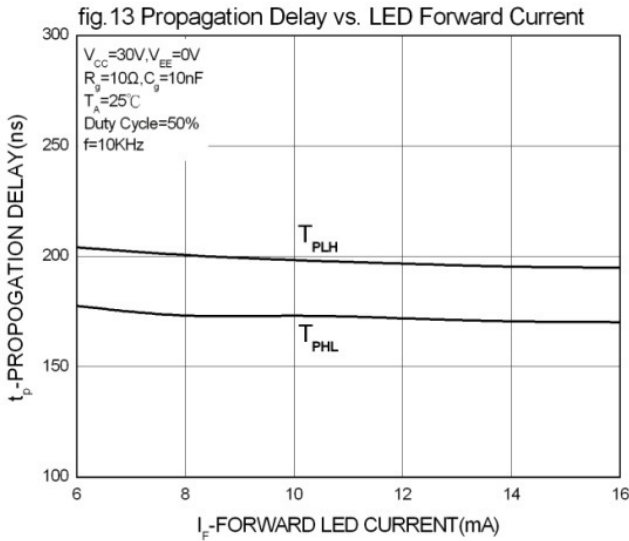
Fig.12 Propagation Delay vs. Supply Voltage



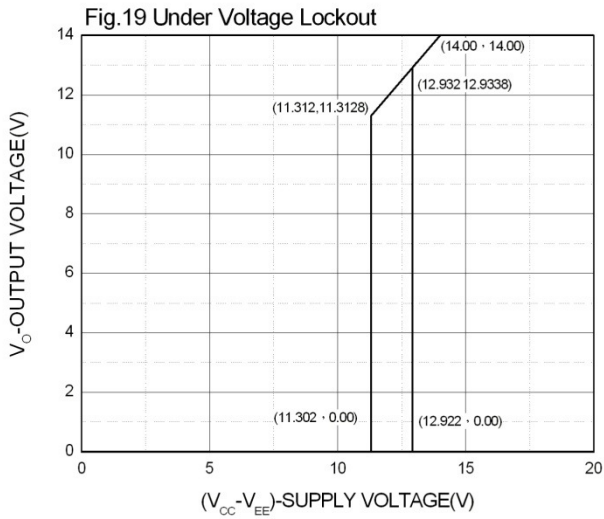
8PIN DIP IGBT/MOSFET

2.5A Output Current GATE DRIVER PHOTOCOUPLER

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8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120



Order Information

Part Number

EL3120Y(Z)-V

Note

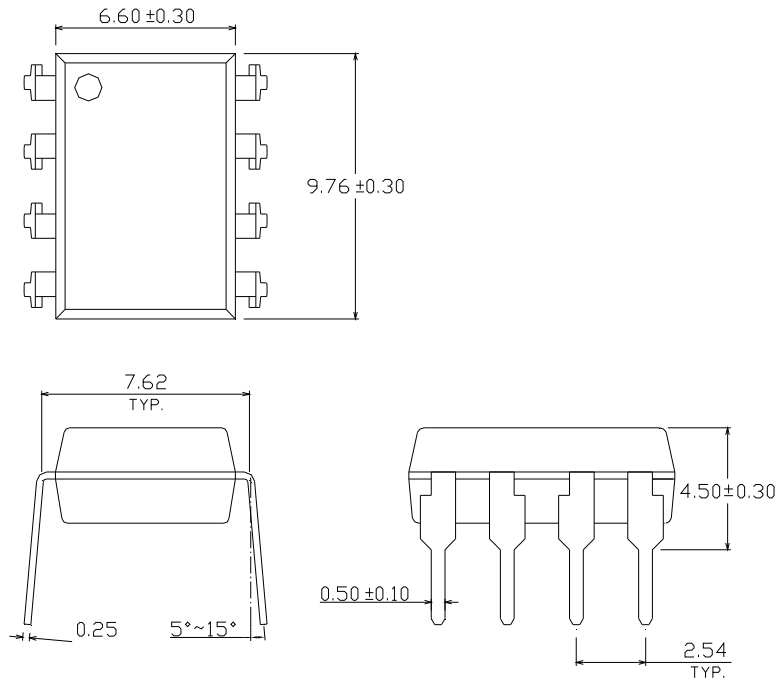
- Y = Lead form option (S, M or none)
- Z = Tape and reel option (TA, TB or none).
- V = VDE (optional)

Option	Description	Packing quantity
None	Standard	45 units per tube
M	Wide lead bend (0.4 inch spacing)	45 units per tube
(TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
(TB)	Surface mount lead form + TB tape & reel option	1000 units per reel

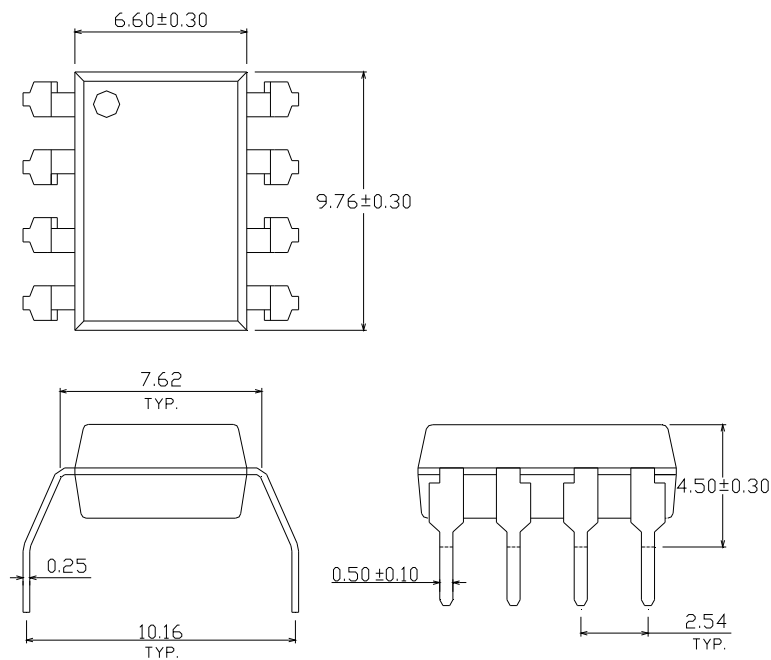
8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120

Package Drawing (Dimensions in mm)

Standard DIP Type

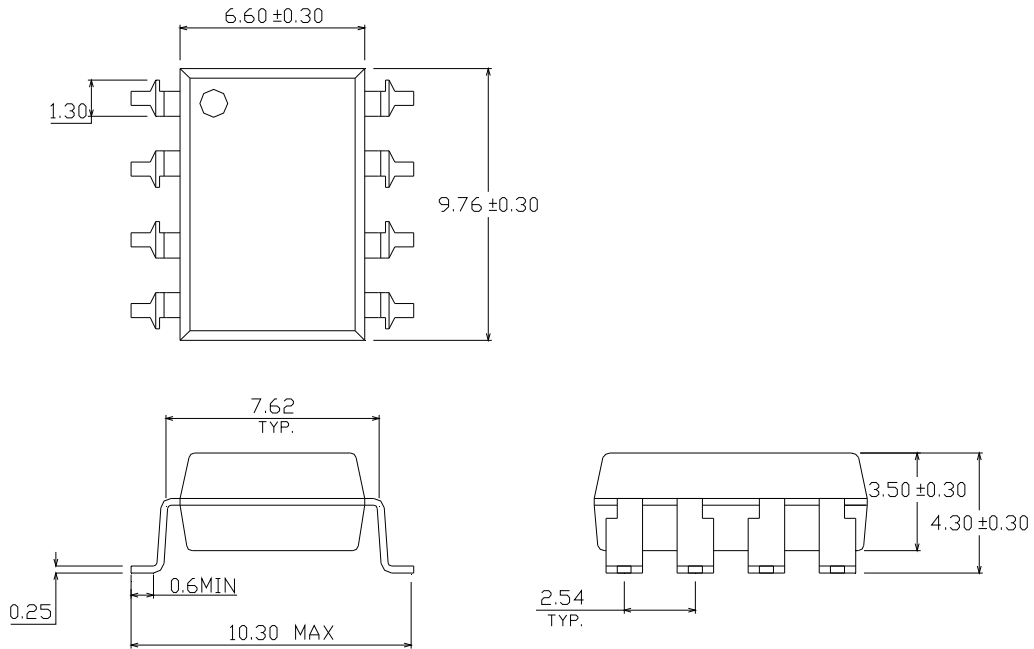


Option M Type

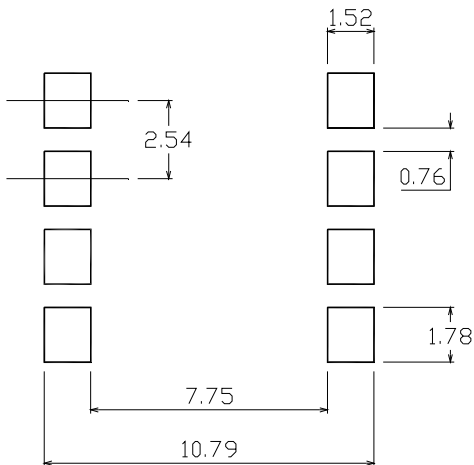


8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120

Option S Type



Recommended pad layout for surface mount leadform

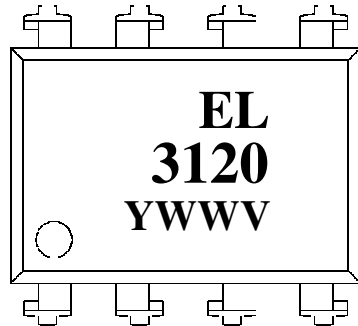


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2.5A Output Current GATE DRIVER PHOTOCOUPLER

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Device Marking

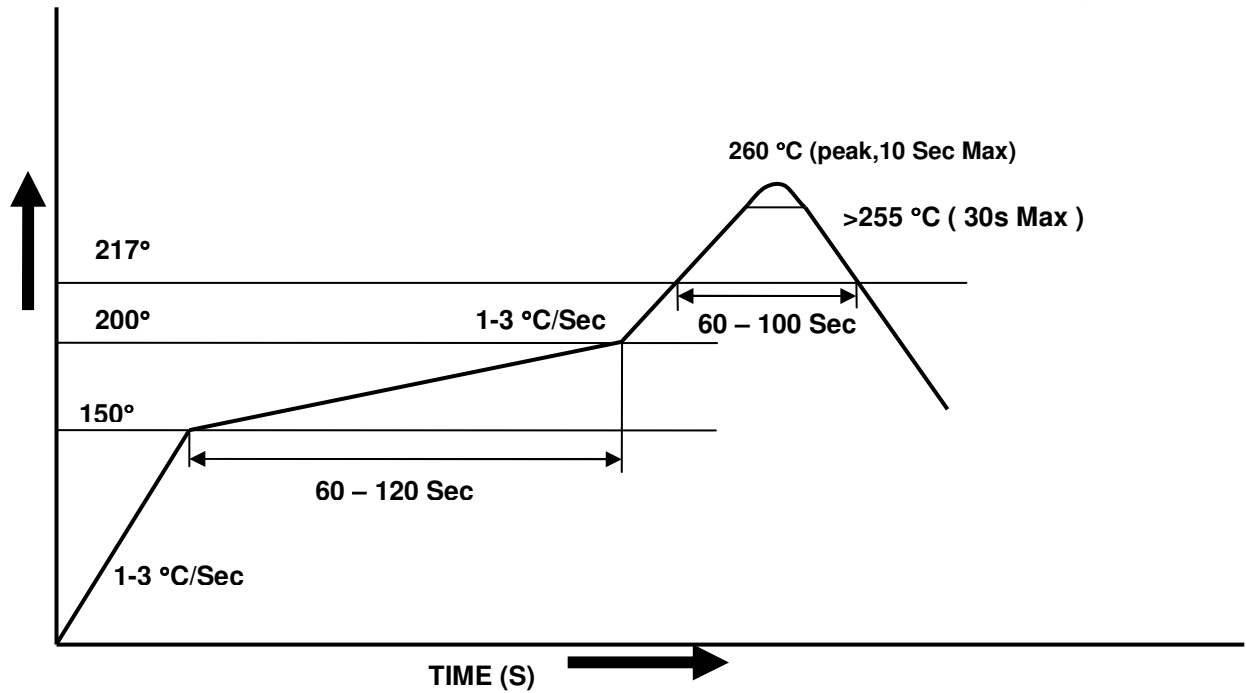


Notes

- 3120 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- V denotes VDE (optional)

8PIN DIP IGBT/MOSFET 2.5A Output Current GATE DRIVER PHOTOCOUPLER EL3120

Solder Reflow Temperature Profile



8PIN DIP IGBT/MOSFET

2.5A Output Current GATE DRIVER PHOTOCOUPLER



EL3120

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